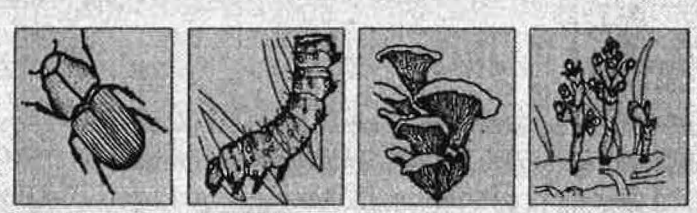
Forest Health Protection



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DOUGLAS-FIR BEETLE POPULATION SURVEYS
IDAHO PANHANDLE NATIONAL FORESTS, 1998

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INTRODUCTION

In November 1996, ice, heavy snows, and wind storms damaged and brought down large numbers of Douglas-fir trees. These downed and broken trees were infested in the spring of 1997 by Douglas-fir beetles (DFB). The downed material provided ideal conditions for a population build-up of this bark beetle, which then emerged in the spring of 1998 to infest standing trees. Large numbers of 1998 attacked trees (with beetle frass on the outside of the bark) were noticed during the summer by field personnel before tree crowns began to fade. Currently infested trees were not mapped during our regular aerial survey in late July and early August because their crowns were still green. However, some currently infested trees began to fade by September. A second aerial detection flight was conducted in late September covering only areas with known beetle populations which were of greatest concern to the Forest (about 20% of the IPNFs). Following the second aerial detection survey, we conducted ground surveys to determine the ratio of green infested trees to early fading trees. Because DFB often attacks trees fairly high on the bole (above 10 feet), success of DFB attack could not be determined with great accuracy from the ground. A sample of trees were felled (destructive sampling) to determine success of attack above where we could reach. In addition, a small number of trees at the Priest Lake Ranger District were sampled to determine the ratio of DFB brood produced to attacking adults. This ratio gives us a better idea of whether a DFB population is building or declining. This report documents our findings.

METHODS

Group Sampling

Polygons identified from aerial survey maps were visited on the ground. A total of 12 polygons with 1998 attacked trees were randomly identified and surveyed. We examined every attacked tree (those with beetle frass) within an attacked group and took the following information: presence or absence of pitch streamers, diameter at breast height (d.b.h), presence or absence of DFB galleries at breast height, degree of crown fade (red, yellow, green), position of fade within the crown (top, lower branches, mottled, or total crown), crown condition (thinning, broken top, etc.), and habitat type within the group.

Destructive Sampling

A total of 65 beetle attacked trees were felled and examined on the ground by Forest Health personnel and by Ladd Livingston, Idaho Dept. of Lands. The majority of trees examined were on the Coeur d'Alene River Ranger District and 15 were in the Joseph Plains area. Areas of bark along the bole were removed at various intervals to determine presence or absence of successful DFB galleries.

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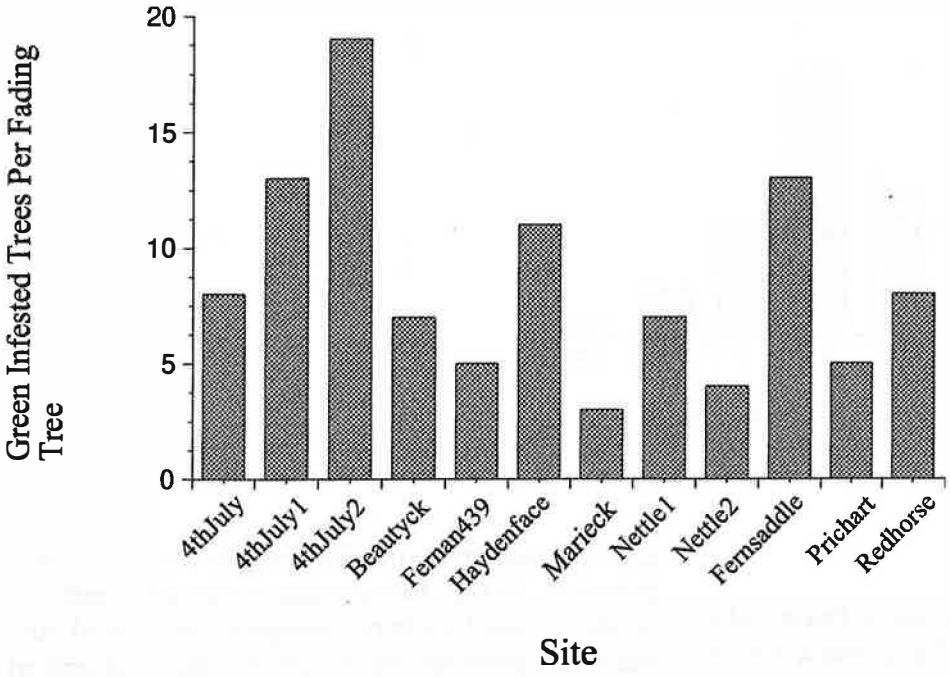
Figure 1. Number of green infested trees for every fading tree on 12 sites.



Destructive Sampling

Of 65 trees cut for examination on the ground, 64 had frass on the bole and one had only pitch streamers to indicate beetle attack. The tree with only pitch streamers and no frass had no successful beetle galleries anywhere along the bole. Of the 64 with frass, 56 (88%) had successful DFB galleries somewhere on the bole. Of those trees, 24% had galleries at BH, 46% didn't have galleries below 9.5 feet above ground level, and 30% didn't have galleries below 14.5 feet or higher (figure 2). The presence of successful galleries indicates those trees would have died from beetle attack and subsequent spread of pathogenic fungi carried by the beetles. The average length along the bole containing successful galleries was 32 feet (range 10-70 feet). Flatheaded woodborer galleries were found above and/or below DFB galleries in 32% of the trees. Another bark beetle, *Scolytus unispinosus,* was found in the tops of 7% of the trees, all of which were located in the Joseph Plains area. No other bark beetles were found. Average diameter of successfully attacked trees was 20.3 inches. Average diameter of trees unsuccessfully attacked was 16.5 inches. Of the successfully attacked trees, 60% had pitch streamers and 40% did not. Of the trees with unsuccessful attacks, 88% had pitch streamers and 12% did not. Height of pitch streamers varied from 11 to 70 feet along the bole from ground level. Unsuccessful DFB attacks were found under the bark in the area covered by pitch streamers. Average age of trees examined was 115 years (range 90-210).

groups we sampled occurred on moist habitat types (hemlock, cedar, and grand fir).

Our destructive sampling shows that 88% of trees attacked in 1998 contain successful beetle galleries and will die. We found 12% of attacked trees had unsuccessful beetle galleries which is less than what was reported during an outbreak that occurred on the Clearwater National Forest from 1970-74 (Furniss et al. 1979). During that outbreak, unsuccessful attacks ranged from 22% to 58% during the 4 years data was collected from 1971-74 (4-year average 42%). However, they were not able to examine beetle populations during the first year of the outbreak in standing trees as we did here. It is likely that the number of unsuccessfully attacked trees will increase during subsequent years of the current outbreak as beetle numbers decline. Also, they determined success of attack from the ground and may have overestimated the number of unsuccessful attacks as indicated when trees were re-sampled from ladders at heights of 10 to 12 feet (Furniss et al. 1979).

The combination of large numbers of successfully attacked trees and brood to parent beetle ratios greater than one, is evidence that the DFB population is not yet declining. High populations are expected to emerge in the spring of 1999 to attack additional trees.

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